

October 15, 2021

Taiwan Semiconductor Manufacturing Corporation (\$TSM): Conducting Moore's Orchestra

Key Takeaways

- Taiwan Semiconductor Corporation is one of the most important and also competitively dominant companies on Earth. It's competitive advantage has likely only just begun.
- We see the primary risk of a military conflict over Taiwan as diminishing as the United States coalesces around Chinese containment. Furthermore, China's military still seems years away from being able to successfully and confidently conduct such an operation.
- The domestic pressures building in China are likely to be the immediate concern of the ultra-paranoid and power conscious CCP. Chinese real estate market woes and demographic headwinds make what would be a wreckless gamble seem unlikely.
- TSM is currently slated to dominate the end of the silicon age with one of our previous semi-favorites, ASML. If ASML was the *Jewel of The Empire*, TSM is an empire in its own right.
- The company's prodigious status and centrality to the progress of human civilization masks a Spartan corporate culture that enables them to effectively advance innovation better than peers. Moore's Law has never been assured, but rests on collective success and cooperation of hundreds of crack engineers and thousands of support staff.

Moore's Law is probably one of the most over-cited and over-used themes in business discourse. Many people unfortunately use it to concoct well-sounding arguments that are often resting on what we could call intellectual vapor. You will find no intellectual vapor at the subject of this week's Signal though. TSM is the 11th largest company and the Technology juggernauts we all revere and which have changed our lives so much are wholly reliant on TSM. It is indispensable to the global economy.

Without the fierce dedication and tireless work of hundreds of engineers at Taiwan Semiconductor Manufacturing Corporation the law may have already come to a wall as the limits of physics approach. However, for the remainder of the famous law's shelf-life, which should be at least a decade it is very likely that TSM's undisputed dominance and considerable innovation lead will only continue to grow unimpeded by a far less capable competition.



Source: *The Experts Look Ahead: Cramming More Components Onto Integrated Circuits*, Gordon Moore, 1965

However, when you read Gordon Moore's [original paper](#) you will probably be surprised that what Moore is describing is almost more analogous to a continuous orchestra of high-octane innovation. The coordination and

back-breaking work of hundreds of engineers and thousands of support staff is required to accomplish the miracle of the modern age that has been at the foundation of human progress. If Moore's Law actually describes an orchestra of engineers, not an assured progression, then TSM is the Vienna Philharmonic. Intel and Samsung would be lowlier on the totem pole, maybe college level in comparison.

It Takes An Orchestra To Play A Symphony

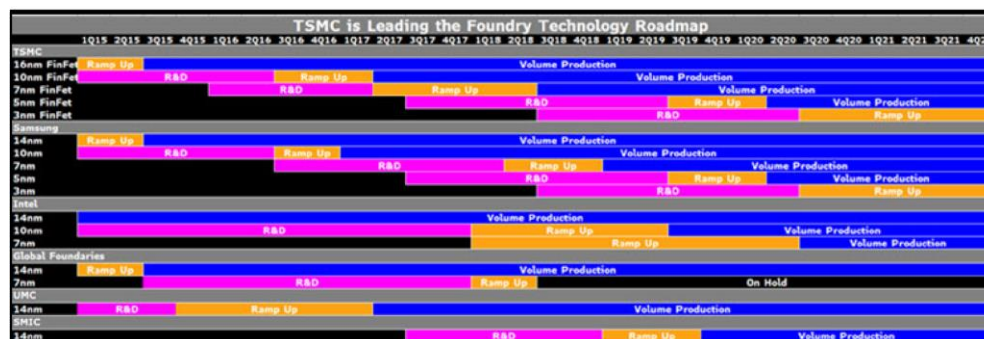
They don't have much hope at competing at the cutting edge of 5nm and 3nm technology. TSM can afford and will have significantly more of ASML's EUV lithography machines meaning it has way higher capacity and also higher pricing power to go along with it. The orchestra of militant engineers at this company will continue to produce what straddles the precipice between innovation and the miraculous.

	5nm vs. 7nm	3nm vs 5nm	3nm vs 7nm
TSMC			
Power Savings	30.0%	>25%	>47.5%
Performance	15.0%	>10%	>26.5%
Transistor Density	1.8x	1.7x	3.06x
Samsung			
Power Savings	20.0%	50.0%	60.0%
Performance	10.0%	>30%	>43%
Transistor Density	1.33x	1.5x	2x

Bloomberg

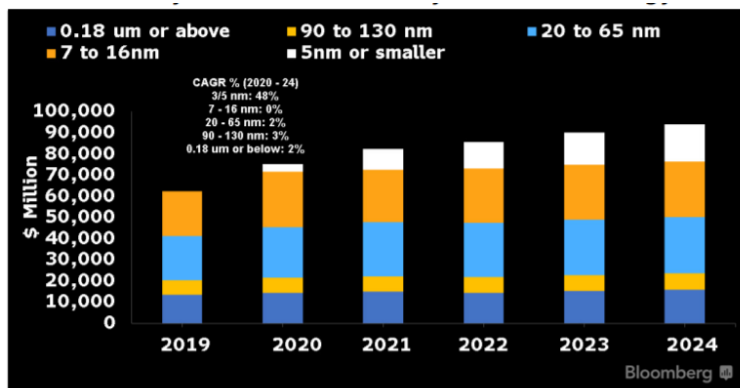
Source: Bloomberg Intelligence

Intel once dominated this process, but now there really is no substitute for TSM. Not only do they have by far the most advanced manufacturing capacity but the momentum they have built in the innovation arms race has put them well-ahead of any competitors, so much so that Intel and Samsung wouldn't even really dare to try to compete head-to-head. TSM's lead in technology and advanced capacity won't be easy to undermine.



Source: Bloomberg Intelligence

The areas dominated by TSM are growing in importance and total composition demand. For those concerned about rising CAPEX at the company we'd point out that it used to take 2 years for cutting edge chips to comprise 20% of the firm's income. Now it takes six months. This company's meticulous attention to CAPEX is part of the reason we believe you should own it. Trust that the orchestra will produce something you will like as a shareholder because that has been the case since 2012.



Source: Bloomberg Intelligence

The Taiwanese labor ethic is Spartan and intangible value of having the most important and lucrative regional innovation cluster on the planet Earth means what Taiwan has fostered on its shores is truly indispensable to the human race. China knows this. The United States knows this. Do you think either country wants to see the supply-chain for the world's most advanced technologies interrupted in a way that would likely dramatically undermine political stability? Probably not, although there's always a chance irrational people have their hands on the wrong buttons.

While some analysts may actually fret at this concentration of risk they may not realize that the Taiwanese government has encouraged this reality in what may have been one of the most ingenious ways to play two great competing powers off of each other since Josip Tito, Yugoslavia's famously shrewd former President whose nation sat between the Eastern and Western Blocs.

So, what about war? Aren't the Godless Chinese Communists just waiting to invade? We think there's a lot of political value in Xi's bluster but given domestic pressures and the removal of Real Estate, one of the primary methods of acquiring individual wealth in China, we highly doubt he's in the mood to test the most powerful military force the world has ever known. There's simply too much risk in that decision and many in China probably rightly feel that the United States would *welcome* the opportunity to compete on a plane in which it is so clearly dominant.

✈ Air Forces

	US	CN	
Total aircraft:	12,930	4,630	
Fighter aircraft:	461	1,049	+
Multirole aircraft:	2,417	1,130	+
Attack aircraft:	566	120	+
Helicopters:	4,741	1,355	+
UCAV (combat drone):	334	151	+

Source: https://armedforces.eu/compare/country_USA_vs_China

However, we suspect this Cold War will be even colder than the decades-long confrontation with the Soviet Union given the unprecedented economic integration between China and the United States. In many ways the lynchpin of the entire global economy rests on Taiwan but it is also the lynchpin of Chinese and US commerce in a way.

The largest technology companies on both sides of the Pacific would be neutered without TSM's advanced manufacturing capacity and their innovative *off-the-shelf, fab-as-a-service model*. Moore's second law, as it is called in the industry means that shrinking the size of chips in half often doubles the price of production.

A cutting edge semi-conductor fab will set you back tens of billions of dollars these days, something even the world's largest and very cash rich company would probably like to avoid. TSM is many ways Apple's most necessary partner and the companies are indelibly tied to each other.

Greed Brings Pain

"The Allies cannot subjugate the Germans. There are too many of the devils, and they are too competent" —Russel Lefingwell

Russel Lefingwell was a famous JP Morgan partner who would eventually go on to be President of the Council on Foreign Relations. At the time he said this about Germany it was militarily dominant. As we today read headlines often laden with pessimism about a rising China and declining United States, we'd like to remind our readers that eighty years ago "the experts" also saw Britain's fall to the Third Reich as a virtual certainty. This logic wasn't based on nothing as the unprecedented *Blitzkrieg Campaign* shocked and amazed the world. This was probably made even more poignant by the intransigent bloodbath of the Western Front in the First World War.

When it became clear that Britain would not be swept off the map by Hitler's truculent hordes the British stock market actually began rising in June 1940, well before victory was assured. So even in a bad, but not catastrophic, scenario like Taiwan being blockaded or outlying islands being occupied, remember that an 80-90 mile cross-channel amphibious operation is very difficult even for a country who enjoys conventional military superiority.

The United States could make life for the Peoples Liberation Army a living hell, and we don't mean that metaphorically. Fire and brimstone from the sky are usually good deterrents. Given the history of Chinese leadership and willingness to use its military, it seems more likely that recent aggression and military buildups are more intended to prevent Taiwan from declaring independence than actually subduing it.

China has made strides in its military prowess, but it is nowhere near ready to go toe to toe with Uncle Sam and it likely never will be. The Seventh Fleet is a potent force despite China's rise in asymmetric military capabilities. The costs to the Chinese would likely be very significant and given a litany of emerging domestic concerns seems like a very unwise gamble for a state facing powerful social forces it wants to contain.

Those who suspect Taiwan won't defend itself probably don't have the best understanding of Taiwanese culture or military [options](#). Recent [statements](#) indicate as much. Also, Chinese military has been to counter US power in asymmetric fashion, but it may get thrown a curveball by asymmetric strategies that proved so successful against the Germans if the rubber meets the road.

Chinese military leaders likely know a cross-channel invasion is fraught with what are probably unacceptable risks for the meticulous Chinese state. The attitude of Deng Xiaoping that reunification issues should be left to "wiser generations" of the future is still poignant. A lot of the perceived elevated risk of war is probably made to seem more significant given the massive incentive hawkish groups in both countries have, and the domestic political value, of having an international villain to coalesce around.

All That And A Bag Of Chips

We covered \$ASML in this column a few months ago and referred to it and called it as the *Jewel Of The Empire*. Taiwan Semiconductor Corporation is an empire in its own right and it is very likely only approaching the height of its power. ASML is the lynchpin of the future march of *Moore's Law*, but TSMC has a profound mastery over the present and the continued technological progress of humanity. It produces roughly of 84% of all advanced chips and pioneered the *fab-as-service* model.

Wafer Revenue by Technology			
	3Q21	2Q21	3Q20
5nm	18%	18%	8%
7nm	34%	31%	35%
10nm	0%	0%	0%
16nm	13%	14%	18%
20nm	0%	0%	1%
28nm	10%	11%	12%
40/45nm	8%	7%	8%
65nm	4%	5%	5%
90nm	2%	3%	2%
0.11/0.13um	3%	3%	2%
0.15/0.18um	6%	6%	7%
0.25um and above	2%	2%	2%

Net Revenue by Platform			
	3Q21	2Q21	3Q20
Smartphone	44%	42%	46%
High Performance Computing	37%	39%	37%
Internet of Things	9%	8%	9%
Automotive	4%	4%	2%
Digital Consumer Electronics	3%	4%	3%
Others	3%	3%	3%

Net Revenue by Geography			
	3Q21	2Q21	3Q20
North America	65%	64%	59%
Asia Pacific	13%	15%	10%
China	11%	11%	22%
EMEA	6%	6%	5%
Japan	5%	4%	4%

Source: Company Reports

It has also recently answered a key criticism about geographic concentration. It will begin building advanced capacity in both the [United States](#) and [Japan](#) to the delight of the governments of both nations. The delicate dance around Taiwan, while sensational and attention-worthy is unlikely to result in World War III anytime soon in our estimation.

TSMC's Free Cash Flow Scenario

(unit: NT\$ billion)		2018	2019	2020	Scenario Analysis			
					2021	2022	2023	2024
Sales	Growth	1,031.47	1,069.99	1,339.25	1,540.14	1,694.16	1,863.57	2,049.93
		6.0%	4.0%	25.0%	15.0%	10.0%	10.0%	10.0%
Operating Income	Margin	383.71	372.35	566.50	646.86	711.55	782.70	860.97
		37.2%	34.8%	42.3%	42.0%	42.0%	42.0%	42.0%
Operating Cash Flow		588.80	630.46	834.15	960.84	1,071.26	1,190.76	1,295.23
Capex	% Sales	315.60	460.42	511.93	750.05	880.96	987.69	1,045.46
		30.6%	43.0%	38.0%	48.7%	52.0%	53.0%	51.0%
					Capex (2022-2024) TOTAL: 2,914.12			

Source: Bloomberg Intelligence

The company will have subdued cashflow, but this will significantly increase after 2024 if the past is any indicator. We do like this stock for a longer time horizon and think it is a keeper in the portfolio. Recent price weakness provides a decent entry point in our estimation. Like ASML (who is indelibly linked to this firm), we think they have one of the most unassailable competitive advantages on Earth. There's always a chance that Intel or Samsung has some unexpected breakthrough, but even then it would take years to operationalize and implement such an advantage, which has its own risks for those chief competitors.

The Unthinkable Is Still Unthinkable

Aside from the obvious risk of having everything concentrated in an earthquake-prone potential invasion target, the diversification from customers and from products is very strong. So much so, that when Huawei the company's second biggest customer was subject to a ban it was really no sweat of the company's back.

We believe there is a reason why no two nuclear armed states have been involved in a direct confrontation and would suggest this precedent will hold. The US nuclear arsenal has become more precise and is more usable from several vantages than in the past and China knows this. US efforts in the region to bolster security will pay more dividends as time goes on.

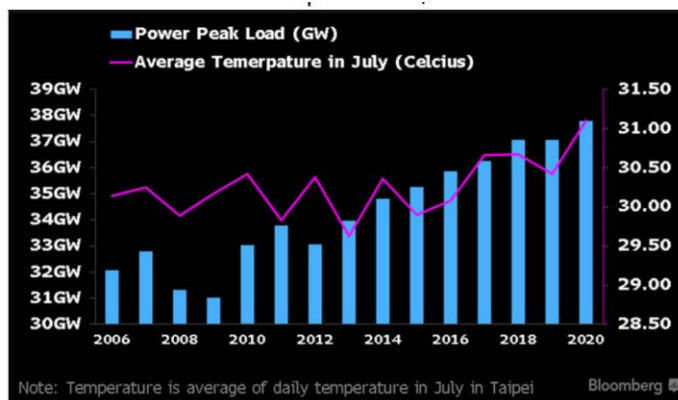
This is probably the central issue for the Pentagon right now, meaning China's advantages will be *lessened* not *increased* over time. Despite domestic political strife, the Trump and Biden China policy are very similar. China's hesitation might even be more great under Biden because of his focus on using regional alliances and reinvigorating the US post-war global order, although the thoughts of CCP leadership will always likely be an impenetrable black box.

Risks And Where We Could Be Wrong

We could be underestimating the will of Chinese leadership to achieve unification in a quick way. However, even in the event of a Chinese invasion we'll give you a little piece of advice. The safest place on the island would likely be a TSMC fab. We do realize the increasing CAPEX will mean lower free cash flow metrics over the coming years; however, we expect their efforts to pay off in handsome margin-expanding fashion as they have in the past. Recent earnings have shown strength.

We also see the CAPEX cycle being mitigated by issues in the Chinese Real Estate Market. A second order effect of this should be for more capital to come into the Taiwanese stock market and TSM hovers between 40% and 50% of the total market cap. Passive flows should provide price support even as cashflow metrics become slightly less attractive. Again, the fact that this company will be spending around \$100 billion in the next three years is more a reason you want to buy it then sell it in our view.

We could be underestimating Chinese strides in technology that could have a great bearing on any potential conflict. A Pentagon official recently [claimed](#) that China has already won the AI conflict but we would take that with a heavy dose of civil-servant, seething resentment salt. A major mitigating factor to all risks is the immense pricing power that the company has. It has decided not to lower prices in December 2021, when it normally would, which in this hyper-cyclical industry has the same effect as raising them.



Source: Bloomberg, Taipower

The tail risk of invasion, earthquake or an unprecedented breakthrough in quantum computing are the three primary risks we see. Rising temperatures is Taiwan putting stress on the power grid, which could be an incremental risk particularly since the companies power demands should be doubling in the next few years. As long as nobody stirs the straight, we should see uninterrupted commercial dominance and a continuation of the beautiful, innovative orchestra of Moore's Law with TSMC as its chief conductor.

Date	Topic	Subject / Ticker	The Signal
10/08/21	Stock	Hilton Worldwide (HLT)	Success Is Never Final, Failure Is Never Fatal
09/30/21	Stock	Align Technologies (ALGN)	You’re Never Fully Dressed Without A Smile
09/24/21	Stock	Texas Instruments (TXN)	A Solid Bet
09/16/21	Recap	Signal From Noise All Stars	
09/09/21	Stock	Baker Hughes (BKR)	I Will Survive
09/02/21	Recap	Q2 Wrap Up	
08/26/21	Stock	General Dynamics (GD)	Speak Softly And Carry A Big Stick
08/19/21	Stock	MSG Entertainment (MSG)	Born In A Crossfire Hurricane
08/12/21	Stock	KeyCorp (KEY)	A Leading Regional Bank With A Strong Risk Profile
08/05/21	Stock	JetBlue (JBLU)	New COVID Reality May Increase Competitive Advantage
07/29/21	Stock	NetApp Inc. (NTAP)	NetApp Is Tomorrow’s Beauty Queen
07/22/21	Stock	American Tower (AMT)	Towering Over The Headline Risk
07/15/21	Stock	Aptiv (APTV)	The Oracle of Aptiv
07/08/21	Stock	Dexcom (DXCM)	Dexcom: Battle Tested and Data-Driven
07/01/21	Stock	Alibaba (BABA)	BABA: Rich Country, Strong Army
06/24/21	Stock	Live Nation (LYC)	LYV: We Love Rock N’ Roll
06/17/21	Stock	Booking Holdings (BKNG)	BKNG: Workhorse, Not Showpony
06/13/21	Stock	Nvidia (NVDA)	Nvidia: The Cisco Kid
06/04/21	Stock	EOG Resources Inc. (EOG)	EOG: The Death of a Salesman
05/27/21	Stock	American Express (AXP)	DJIA Stalwart American Express Will Likely Flourish....
05/21/21	Stock	CME Group (CME)	CME Group’s History Of Growth and Durable Advantage
05/13/21	Stock	GoPro (GPRO)	Reiterating Bullish Call on GPRO/SFN Update
05/07/21	SPAC	Mudrick Capital (MUDS)	Mudrick Capital’s Topps Deal Is A Sensible SPAC
04/29/21	Stock	Cleveland Cliffs (CLF)	CLF: Strong First Quarter Is Likely Just The Start
04/22/21	Stock	Harley-Davidson (HOG)	HOG: Earnings Blowout Shows Company Moving In Right...
04/15/21	Stock	ASML Holdings (ASML)	ASML: The Jewel of The Empire
04/08/21	Stock	Alaska Air Group Inc. (ALK)	ALK: Fortune Favors The Strongest Balance Sheet
03/27/21	Stock	MGM Resorts Intl. (MGM)	MGM: When Boring Becomes Brilliant
03/19/21	Stock	Schlumberger (SLB)	A Stalwart Energy Name Well Positioned For Coming Boom
03/12/21	Stock	GoPro (GPRO)	GoPro: An ‘Epicenter’ Stock With Reasonably Priced Growth..
03/05/21	Stock	Deutsche Bank AG (DB)	DB Is On The Mend And Very Cheap Compared To Peers
02/26/21	Stock	Six Flags (SIX)	SIX: An Industry-Leading Re-Opening Play With Upside Pot.
02/17/21	Stock	Real Networks (RNWK)	RNWK: From Cautionary Tech Tale To AI Multibagger
02/11/21	ETF	S&P High Beta ETF (SPHB)	SPHB: Getting to Alpha By Way of Beta
02/05/21	Stock	Exxon-Mobil (XOM)	Why Exxon-Mobil Is A Buy Despite Mixed Earnings
01/28/21	Sector	Energy GICS-1 (XLE)	If You Like TSLA’s 2020 Performance, Try The Energy Sector
01/15/21	Stock	Ford (F)	‘Epicenter’ Stock With EV Upside and Great Management
11/05/20	Stock	Ingalls & Snyder	Despite Gyrating Markets, This Manager Returned 40% in ‘19
10/21/20	Stock	10-K Filings Part 3	Other Voices: Why Reading 10-K Filings Is Crucial; Part 3
8/19/20	Stock	10-K Filings Part 2	Other Voices: Why Reading 10-K Filings Is Crucial; Part 2
8/6/20	Stock	Trust Financial (TFC)	Never Heard of Trust? This Bank Stock Could Rise Up to 30%
7/29/20	Stock	Weight Watchers (WW)	Weight Watchers Can Continue to Outperform Post COVID-19
7/22/20	Stock	Xilinx (XLNX)	If EPS Rises to Pre-Covid-19 Level, XLNX Could See Old Highs
7/15/20	Stock	Market Concentration	Narrow Mkt Rally Fuels Worry; We Expect Cyclical To Join
7/8/20	Stock	SEC Filings	Other Voices: Why Reading 10-K Filings Is Crucial; Part 1
7/1/20	Stock	Simply Good Foods (SMPL)	Post-COVID-19, Simply Good Foods Stock Looks Appetizing

Disclosures

This research is for the clients of Fundstrat Global Advisors only. For additional information, please contact your sales representative or Fundstrat Global Advisors at 150 East 52nd Street, New York, NY, 10022 USA.

Conflicts of Interest

This research contains the views, opinions and recommendations of Fundstrat. At the time of publication of this report, Fundstrat does not know of, or have reason to know of any material conflicts of interest.

General Disclosures

Fundstrat Global Advisors is an independent research company and is not a registered investment advisor and is not acting as a broker-dealer under any federal or state securities laws.

Fundstrat Global Advisors is a member of IRC Securities' Research Prime Services Platform. IRC Securities is a FINRA registered broker-dealer that is focused on supporting the independent research industry. Certain personnel of Fundstrat (i.e., Research Analysts) are registered representatives of IRC Securities, a FINRA member firm registered as a broker-dealer with the Securities and Exchange Commission and certain state securities regulators. As registered representatives and independent contractors of IRC Securities, such personnel may receive commissions paid to or shared with IRC Securities for transactions placed by Fundstrat clients directly with IRC Securities or with securities firms that may share commissions with IRC Securities in accordance with applicable SEC and FINRA requirements. IRC Securities does not distribute the research of Fundstrat, which is available to select institutional clients that have engaged Fundstrat.

As registered representatives of IRC Securities, our analysts must follow IRC Securities' Written Supervisory Procedures. Notable compliance policies include (1) prohibition of insider trading or the facilitation thereof, (2) maintaining client confidentiality, (3) archival of electronic communications, and (4) appropriate use of electronic communications, amongst other compliance related policies.

Fundstrat does not have the same conflicts that traditional sell-side research organizations have because Fundstrat (1) does not conduct any investment banking activities, (2) does not manage any investment funds, and (3) our clients are only institutional investors.

This research is for the clients of Fundstrat Global Advisors only. Additional information is available upon request. Information has been obtained from sources believed to be reliable, but Fundstrat Global Advisors does not warrant its completeness or accuracy except with respect to any disclosures relative to Fundstrat and the analyst's involvement (if any) with any of the subject companies of the research. All pricing is as of the market close for the securities discussed, unless otherwise stated. Opinions and estimates constitute our judgment as of the date of this material and are subject to change without notice. Past performance is not indicative of future results. This material is not intended as an offer or solicitation for the purchase or sale of any financial instrument. The opinions and recommendations herein do not take into account individual client circumstances, risk tolerance, objectives, or needs and are not intended as recommendations of particular securities, financial instruments or strategies. The recipient of this report must make its own independent decision regarding any securities or financial instruments mentioned herein. Except in circumstances where Fundstrat expressly agrees otherwise in writing, Fundstrat is not acting as a municipal advisor and the opinions or views contained herein are not intended to be, and do not constitute, advice, including within the meaning of Section 15B of the Securities Exchange Act of 1934. All research reports are disseminated and available to all clients simultaneously through electronic publication to our internal client website, fundstrat.com. Not all research content is redistributed to our clients or made available to third-party aggregators or the media. Please contact your sales representative if you would like to receive any of our research publications.

Copyright 2021 Fundstrat Global Advisors LLC. All rights reserved. No part of this material may be reprinted, sold or redistributed without the prior written consent of Fundstrat Global Advisors LLC.